

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SUMITOMO WIRING SYST LTD

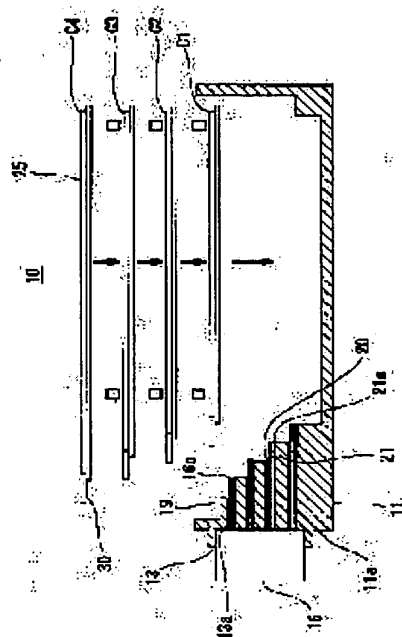
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(72)Inventor : HOSOE KATSUHIRO

**(54) ELECTRICAL CONNECTION BOX AND METHOD FOR ASSEMBLING THE ELECTRICAL CONNECTION BOX****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To improve working characteristics for assembling and connection of an electrical connection box.

**SOLUTION:** An external terminal housing section 13 for housing a connector 16, a fuse and/or a relay is provided on a side wall 11a of an electrical connection box 10, and a terminal penetration section 19a is provided in the horizontal direction on the inner face position thereof. A step-like terminal reception section 21a, which projects toward the inside of a case, is provided across an uppermost terminal penetration section 19d and a lowermost terminal penetration section 19. Terminals 16a of the connector 16, which project from the respective sections 19a into the inside of the case and a relay terminal connected to these external terminals, are connected on printed boards 25 stacked and arranged on the respective layers and on terminals 30 of the busbar terminals.

**LEGAL STATUS**

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[Patent number]

[Date of registration]

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CLAIMS

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[Claim(s)]

[Claim 1] The external terminal hold section of outside opening which holds a connector, a fuse, or/and a relay in the case side attachment wall of an electric junction box is prepared. In the inside location of a case side attachment wall in which this external terminal hold section was prepared, while preparing the terminal penetration section in the terminal hole which carries out vertical juxtaposition, and a location open for free passage horizontally on the base of the above-mentioned external terminal hold section From the terminal penetration section of the maximum upper case, apply to the terminal penetration section of the bottom, make it project to the interior side of a case, and the stair-like terminal receptacle section is prepared. The connector and fuse which are attached in the above-mentioned external terminal hold section, or/and the external terminal of a relay, Or while making the junction terminal linked to these external terminal project from interior side opening of a case of each above-mentioned terminal penetration section Vertical laminating arrangement of the bus bar fixed to the interior of the above-mentioned case on the printed circuit board or/and the electric insulating plate is carried out. The die length by the side of the above-mentioned terminal receptacle section of the electric insulating plate which fixed these above-mentioned printed circuit board or/and the bus bar The electric junction box characterized by having made it correspond to the stair-like terminal receptacle section, having made die length different, and having connected to the conductor or/and bus bar of a printed circuit board the junction terminal linked to the above-mentioned external terminal or this external terminal which projects from the above-mentioned terminal penetration section of the above-mentioned terminal receptacle section.

[Claim 2] The junction terminal linked to the above-mentioned external terminal or this external terminal, and the conductor or/and bus bar of a printed circuit board are an electric junction box according to claim 1 connected by soldering or welding.

[Claim 3] The junction terminal linked to the above-mentioned external terminal or this external terminal, and the conductor or/and bus bar of a printed circuit board are an electric junction box according to claim 1 which one side is used as a male terminal, a receptacle is attached [ electric junction box ] in another side, and sex fitting connection is made [ electric junction box ], or makes pressure-welding connection of this another side as a terminal which established the pressure-welding slot.

[Claim 4] It is the assembly approach of an electric junction box given in any 1 term at claim 1 thru/or claim 3. The electric insulating plate which fixed the above-mentioned printed circuit board or/and bus bar which carry out a vertical laminating, and which are held in the interior of the above-mentioned case In an order from [ upper part ] the thing of the lowest layer, insert in the interior of a case and the conductor or bus bar of a printed circuit board is connected to the above-mentioned external terminal or a junction terminal after insertion. Then, the assembly approach of the electric junction box which repeated connection with the above-mentioned external terminal or a junction terminal after inserting into a case one by one, and has connected the connector, the fuse or/and the relay, and the conductor or/and bus bar of the above-mentioned printed circuit board used as an internal circuitry.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention improves the connection structure and the connection method of a connector, a fuse or/and a relay, and an internal circuitry especially about the assembly approach of the electric junction box carried in an automobile, and this electric junction box.

[0002]

[Description of the Prior Art] The approach of showing conventionally the electric junction box carried in an automobile in drawing 12 (A), (B), etc. as a connection method of a connector, a fuse or/and the external terminal of a relay, and an internal circuitry is adopted. By the approach shown in drawing 12 (A), the tip of the bus bar 1 which constitutes an internal circuitry is made refracted, it is referred to as male terminal 1a, and fitting connection is made at terminal 3a of the female configuration of a connector 3. By the approach shown in drawing 12 (B), the printed circuit board 2 which constitutes an internal circuitry, and terminal 3a by the side of a connector are connected through lead wire 4.

[0003]

[Problem(s) to be Solved by the Invention] While the circuit held in the interior of an electric junction box, i.e., the number of laminatings of a bus bar or a printed circuit board, is increasing rapidly recently with rapid increase of the electronic autoparts carried in an automobile, the increment in a connector pole and the components mark for forming a branch circuit in high density further are also increasing. Therefore, in the above conventional connection methods, connection structure became complicated and there was a problem of assembly operation having been difficult and taking time and effort increasingly.

[0004] This invention was made in view of the above-mentioned problem, improves the connection structure of a connector, a fuse or/and the external terminal of a relay, and an internal circuitry, and is offering the technical problem the assembly approach of the electric junction box which can do the attachment activity to the case of an internal circuitry easily and efficiently, and this electric junction box.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention on the case side attachment wall of an electric junction box A connector, The external terminal hold section of outside opening which holds a fuse or/and a relay is prepared. In the inside location of a case side attachment wall in which this external terminal hold section was prepared, while preparing the terminal penetration section in the terminal hole which carries out vertical juxtaposition, and a location open for free passage horizontally on the base of the above-mentioned external terminal hold section From the terminal penetration section of the maximum upper case, apply to the terminal penetration section of the bottom, make it project to the interior side of a case, and the stair-like terminal receptacle section is prepared. The connector and fuse which are attached in the above-mentioned external terminal hold section, or/and the external terminal of a relay, Or while making the junction terminal linked to these external terminal project from interior side opening of a case of each above-mentioned terminal penetration section Vertical laminating arrangement of the bus bar fixed to the interior of the above-mentioned case on the printed circuit board or/and the electric insulating plate is carried out. The die length by the side of the above-mentioned terminal receptacle section of the electric insulating plate which fixed these above-mentioned printed circuit board or/and the bus bar Make it correspond to the stair-like terminal receptacle section, die length is made different, and the electric junction box characterized by having connected to the conductor or/and bus bar of a printed circuit board the junction terminal linked to the above-mentioned external terminal or this external terminal which projects from the above-mentioned terminal penetration section of the above-mentioned terminal receptacle section is offered.

[0006] That is, while carrying out alignment of an external terminal and the terminal of an internal circuitry so that the inside-and-outside terminals connected beforehand may counter, the connecting location has shifted the connecting location stair-like so that it may consider as a case side attachment wall and a connecting location may move outside toward the upper layer from a lower layer. since the inside-and-outside terminal to connect will have countered horizontally when it can hold in the interior of a case easily sequentially from the thing of the lowest layer and holds even if the printed circuit board or/and bus bar which constitute an internal circuitry are a multilayer if it is the above-mentioned configuration -- much more -- every -- inside and outside -- a terminal -- laminating arrangement can be carried out connecting correctly and easily, and the assembly-operation nature of an electric junction box can be raised.

[0007] In addition, you may make it gradually long on a target, applying [ though the die length of an external terminal is gradually changed on a target in a vertical layer as an approach of shifting a connecting location stair-like in a vertical layer and also the die length of an external terminal is the same in a vertical layer, may intervene a junction terminal in a this external terminal and interior terminal, may connect, and ] the die length of this junction terminal to the upper layer from a lower layer.

[0008] As for the junction terminal linked to the above-mentioned external terminal or this external terminal, and the conductor or/and bus bar of a printed circuit board, connecting by soldering or welding is desirable.

[0009] Or the junction terminal linked to the above-mentioned external terminal or this external terminal, and the conductor or/and bus bar of a printed circuit board use one side as a male terminal, may attach a receptacle in another side and may make sex fitting connection. Furthermore, pressure-welding connection of another side may be made as a terminal which established the pressure-welding slot. In this case, the inside-and-outside terminal strapping of all the layers that shifted the connecting location stair-like can be made to be able to complete at a stretch only by pushing strongly the printed circuit board or/and bus bar by which laminating hold was carried out inside the case by attaching a terminal from a top so that receptacle opening which inserts a male terminal, or the above-mentioned pressure-welding slot may turn to the upper part, and the effectiveness of terminal strapping and assembly operation can be raised sharply.

[0010] Moreover, this invention offers the assembly approach of an above-mentioned electric junction box. Namely, the electric insulating plate which fixed the above-mentioned printed circuit board or/and bus bar which carry out a vertical laminating, and which are held in the interior of the above-mentioned case In an order from [ upper part ] the thing of the lowest layer, insert in the interior of a case and the conductor or bus bar of a printed circuit board is connected to the above-mentioned external terminal or a junction terminal after insertion. Then, after inserting into a case one by one, connection with the above-mentioned external terminal or a junction terminal is repeated, and the electric junction box which has connected the connector, the fuse or/and the relay, and the conductor or/and bus bar of the above-mentioned printed circuit board used as an internal circuitry is assembled.

[0011]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0012] Drawing 1 thru/or drawing 3 showed the electric junction box 10 concerning the 1st operation gestalt of this invention, and this electric junction box 10 has held C4 in the interior of the case which consists of a lower case 11 and an upper case 12 from the internal-circuitry plate C1.

[0013] As shown in drawing 3, the connector hold section 13 of outside opening which holds a connector 16 was formed in one side-attachment-wall 11a of the above-mentioned lower case 11, and the fuse hold section 14 of outside opening which holds a fuse 17 in the top face of an upper case 12, and the relay hold section 15 of outside opening which holds relay 18 are provided in it.

[0014] In the base of the above-mentioned connector hold section 13, terminal hole 13a is installed in four steps of upper and lower sides side by side, and while forming horizontally the terminal penetration section 19 of four steps of upper and lower sides in the location which is open for free passage to these terminals hole 13a, respectively, the stair-like section 21 which was missing from the terminal penetration section 19 of the bottom from the terminal penetration section 19 of the maximum upper case, and was made to project to the interior side of a case is formed in the inside location of side-attachment-wall 11a of a lower case 11. The above-mentioned terminal penetration section 19 penetrates this stair-like section 21 at a horizontal, respectively, and forms the interior side opening 20 of a case in each story vertical plane of this stair-like section 21. Moreover, each story horizontal plane of this stair-like section 21 constitutes terminal receptacle section 21a supporting terminal 16a by the side of the connector which penetrated the above-mentioned terminal penetration section 19, and was projected from the interior side opening 20 of a case. Alignment is

carried out beforehand and the location of these terminals hole 13a and the terminal penetration section 19 is designed so that it may counter with the location of the internal terminal connected when the circuit plates C1-C4 are held in a lower case 11.

[0015] The internal-circuitry plates C1-C4 by which laminating arrangement is carried out into the above-mentioned lower case 11 at four layers all consist of a printed circuit board 25. Moreover, this printed circuit board 25 is changing die length, respectively. Apply to an upper case from the lower berth, and it is made to correspond to the die length of the above-mentioned terminal receptacle section 21a in detail, and is made to extend only in the terminal receptacle section 21a side. The terminal section of the above-mentioned printed circuit board 25 forms the conductor pattern according to a terminal pitch and width of face, or solders or welds [ of a conductor ] the terminal 30 for welding, and is making this terminal 30 for welding project from the periphery of the printed circuit board 25 to the terminal receptacle section 21a side.

[0016] Next, the work habits which hold and assemble the above-mentioned internal-circuitry objects C1-C4 to the above-mentioned electric junction box 10 are explained. First, insert a connector 16 in the connector hold section 13, the terminal penetration section 19 of each stage is made to penetrate terminal 16a by the side of a connector, and it is made to project in a case from the opening 20 by the side of the interior of a case, as shown in drawing 1 . Next, the circuit plate C1 of the bottom is inserted in a lower case 11 from the upper part, and the conductor pattern of the terminal section of a printed circuit board 25 or terminal 30 which carries out phase opposite, and connector side edge child 16a are connected to it with soldering on terminal receptacle section 21a. Subsequently, sequential insertion of the circuit plate C2 of the 2nd step, the circuit plate C3 of the 3rd step, and the circuit plate C4 of the maximum upper case is carried out, connector side edge child 16a is connected with the terminal 30 of the printed circuit board 25 which carries out phase opposite for each class with soldering on terminal receptacle section top 21a, and as shown in drawing 2 , the internal-circuitry objects C1-C4 of four layers are connected to a connector 16. In addition, it may replace with soldering and you may connect by welding.

[0017] The electric junction box 10 assembled by the above-mentioned approach While a lower case 11 carries out opening greatly toward the upper part by having formed the stair-like section 21 from a pars basilaris ossis occipitalis Laminating arrangement of the circuit objects C1-C4 can be carried out easily, repeating hold into every one-layer case, and inside-and-outside terminal strapping sequentially from the circuit object C1 of the bottom, since the connecting location of the internal-circuitry objects C1-C4 of each class and a connector 16 also shifts from the interior toward the outside. The time and effort which checks the inside-and-outside terminal connected with the terminal section pattern on the printed circuit board which connects especially, or the internal and external terminal 30 during an activity since arrangement of a terminal is beforehand designed so that terminal 16a by the side of a connector may carry out phase opposite can be saved, and the effectiveness and accuracy of assembly operation can be raised.

[0018] Drawing 4 and drawing 5 show the modification of the above-mentioned 1st operation gestalt, and it differs from the above-mentioned 1st operation gestalt in that the inside-and-outside terminal is connected not by solder connection but by fitting connection of a sex terminal.

[0019] in detail, it is shown in drawing 4 (A) -- as -- the conductor of a printed circuit board -- connecting the male terminal 31 to a terminal, as a receptacle which has the piece 32 of a spring of a pair at a tip, terminal 16a by the side of one connector inserts the male terminal 31 in that of a receptacle 32, and makes fitting connection. Since the male terminal 31 is inserted in a receptacle 32 from the upper part at this time, the inside-and-outside terminal strapping of each class can be made to complete at a stretch by forcing strongly the printed circuit board 25 which attached the male terminal 32 from a top, as shown in drawing 5 . In addition, terminal 16a may make the male terminal 31 make pressure-welding connection as a terminal which established the pressure-welding slot, as shown in drawing 4 (B).

[0020] Drawing 6 thru/or drawing 10 show the electric junction box 100 concerning the 2nd operation gestalt of this invention. This electric junction box 100 has held C4 in the interior of the case which consists of a lower case 110 and an upper case 120 from the internal-circuitry plate C1.

[0021] As shown in the side attachment walls 110a and 110b which the above-mentioned lower case 110 adjoins at drawing 6 , the connector hold sections 131 and 132 of outside opening which hold connectors 161 and 162 were formed, respectively, and the fuse hold sections 141 and 142 of outside opening which hold fuses 171 and 172 in side-attachment-wall 110b and side-attachment-wall 110c which counters are provided in two steps of upper and lower sides. The relay hold section 15 of outside opening which holds relay 18 is formed in the top face of an upper case 120.

[0022] Terminal hole 141a which inserts a fuse terminal 171 in the above-mentioned fuse hold section 141 as shown in drawing 8 is installed in two steps of upper and lower sides side by side. Terminal hole 142a

which inserts a fuse terminal 172 in the fuse hold section 142 similarly is installed in two steps of upper and lower sides side by side. In the inside location of side-attachment-wall 110c While forming the terminal penetration section 22 in the location which is open for free passage to these terminals hole 141a horizontally, the stair-like section 24 which was missing from the terminal penetration section 22 of the maximum upper case and the terminal penetration section 22 of the bottom, and was made to project to the interior side of a case in the same pitch is formed. The above-mentioned terminal penetration section 22 penetrates this stair-like section 24 at a horizontal, respectively, and forms the interior side opening 23 of a case in each story vertical plane of this stair-like section 24. Moreover, each story horizontal plane of this stair-like section 24 constitutes terminal receptacle section 24a supporting the terminal which penetrated the above-mentioned terminal penetration section 22, and was projected from the interior side opening 23 of a case. When the circuit plates C1-C4 are held in a lower case 110, alignment is carried out beforehand and the location of these terminals hole 141a and the terminal penetration section 22 is designed so that it may counter with the location of the internal terminal which makes phase connection.

[0023] In addition, as shown in drawing 7 and drawing 8, since it is the same as that of the terminal penetration section 19 of the above-mentioned 1st operation gestalt, the interior side opening 20 of a case, the stair-like section 21, and terminal receptacle section 21a, the structure of the terminal penetration section [ which is formed in the configuration of the connector hold section 131 and the inside location of side attachment walls 110a and 110b ], interior side opening of case, stair-like section, and terminal receptacle section attaches the same sign, and omits explanation. moreover, not necessarily perfect, although the height of the stair-like section 21 of side-attachment-wall 110a and the stair-like section 21 of side-attachment-wall 110b is identically set up with this operation gestalt -- it may not be the same and the difference in height can be absorbed with a terminal configuration.

[0024] The internal-circuitry plates C1-C4 by which laminating arrangement is carried out into the above-mentioned lower case 110 at four layers are considered as the configuration which all fixed the bus bar 27 to the electric insulating plate 26. Moreover, this electric insulating plate 26 is making the dimension in every direction different on each class. Apply to an upper case from the lower berth, and it is made to correspond to the die length of the above-mentioned terminal receptacle sections 21a and 24a located in Mikata in detail, and is made to extend to this Mikata, respectively. A male configuration is made to the terminal of the above-mentioned bus bar 27, it is used as the male terminal 33, and is making this male terminal 33 project from the periphery of an electric insulating plate 26, respectively in the three directions of side attachment walls 110a-110c.

[0025] The work habits which hold and assemble the internal-circuitry objects C1-C4 to the above-mentioned electric junction box 100 are explained. First, the junction terminal 35 corresponding to each die length of the terminal penetration sections 19 and 22 with which die length differs is prepared. This junction terminal 35 forms the pressure-welding slot 36 in the both ends, as shown in drawing 9. Pressure-welding connection of the short junction terminal 35 is made one by one at each terminal as pressure-welding connection of the longest junction terminal 35 is made at connector terminal 161a of the bottom, and a fuse terminal 171 and it becomes the pressure-welding slot 36 of the end of this junction terminal 35 on the upper case at this time, although pressure-welding connection of the terminal of a connector and the terminal of a fuse is made.

[0026] Next, insert in the connector hold sections 131 and 132 the connectors 161 and 162 which attached the junction terminal 35, insert fuses 171 and 172 in the fuse hold sections 141 and 142, respectively, the terminal penetration sections 19 and 22 are made to penetrate this junction terminal 35, and it is made to project in a case from the interior side openings 20 and 23 of a case, as shown in drawing 7 and drawing 8. Next, the circuit plate C1 of the bottom is inserted in a lower case 110 from the upper part, pressure-welding connection of the terminal 33 and the junction terminal 35 of a bus bar 27 which carry out phase opposite in three directions, respectively is made on terminal receptacle section 21a, and a bus bar 27, connectors 161 and 162, and a fuse 171 are connected. Subsequently, sequential insertion of the circuit plate C2 of the 2nd step, the circuit plate C3 of the 3rd step, and the circuit plate C4 of the maximum upper case is carried out, making the junction terminal 35 intervene. As pressure-welding connection is made on terminal receptacle section 21a and 24a and the terminal 33 and the junction terminal 35 of a bus bar which carry out phase opposite in three directions, respectively are shown in drawing 10 for each class, the internal-circuitry objects C1-C4 of four layers are connected to connectors 161 and 162 and fuses 171 and 172.

[0027] Laminating arrangement can be carried out easily and efficiently, making insertion and connection one by one from the circuit object of the bottom like the electric junction box 110 of the above-mentioned configuration, by forming the stair-like sections 21 and 24 in the inside location of each side attachment

walls 110a-110c, even if the connector hold sections 131 and 132 and fuses 141 and 142 are formed in two or more side faces of an electric junction box. Moreover, the junction terminal 35 is a general-purpose article, and since size also gathers variously, it can respond to easy for a design change etc., and low cost. [0028] In addition, the tip of a printed circuit board 25 is inserted in the tip inferior surface of tongue of the terminal 16 by the side of a connector, and this invention may solder the conductor of the top face of this printed circuit board 25, and terminal 16a, as it is not limited to the above-mentioned operation gestalt and shown in drawing 11 . Moreover, it is good also as a configuration which attaches connectors, fuses, and all the relays in a side attachment wall.

[0029]

[Effect of the Invention] Since the circuit object of an upper case can be accumulated one by one and assembly and connection can be made to complete according to this invention so that more clearly than the above explanation, connecting the inside-and-outside terminal which inserts into a case and carries out phase opposite by the alignment from a design stage for every layer sequentially from the circuit object arranged at the bottom, the assembly operation of the electric junction box which was conventionally difficult and complicated can raise workability and accuracy.

[0030] Moreover, since the stair-like section was prepared in the case side-attachment-wall inside location equivalent to the connecting location of an inside-and-outside terminal, it applied to the lower berth from the upper case and the connecting location is shifted to the inner direction, when making sex fitting connection of the inside-and-outside terminal, by pushing strongly the internal-circuitry object which carried out laminating arrangement from a top, fitting of the inside-and-outside terminal of all layers can be carried out at a stretch, and the completion of connection can be carried out.

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[Translation done.]

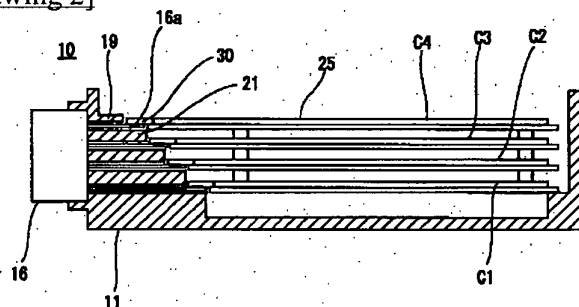
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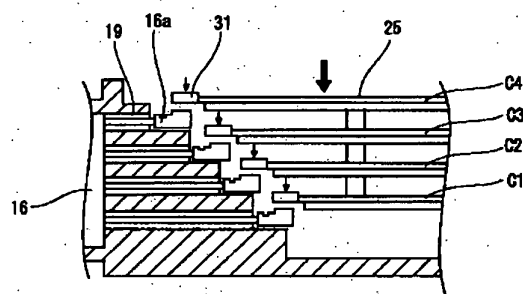
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## DRAWINGS

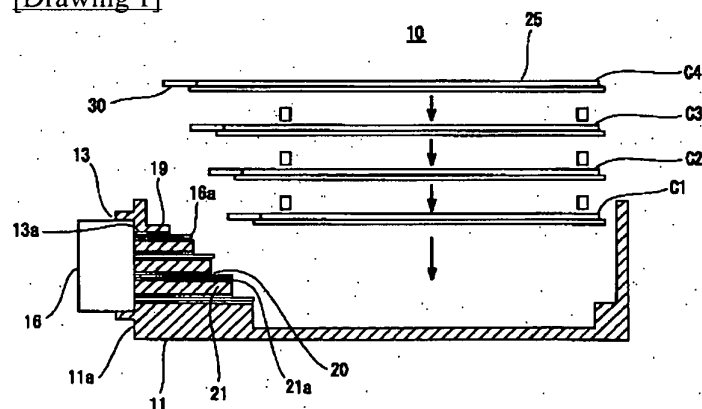
[Drawing 2]



[Drawing 5]

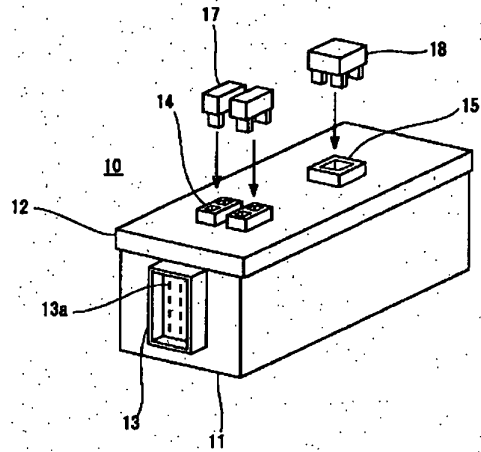


[Drawing 1]

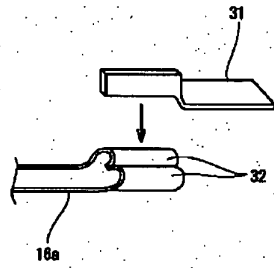


[Drawing 3]

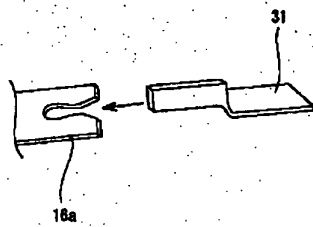




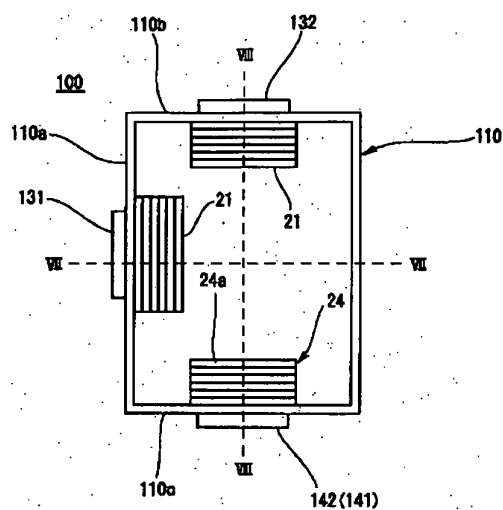
[Drawing 4]  
(A)



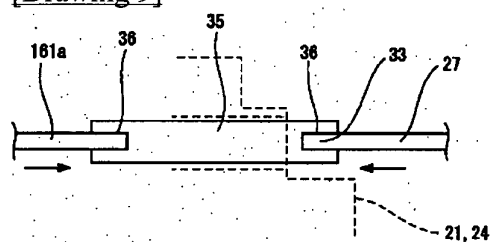
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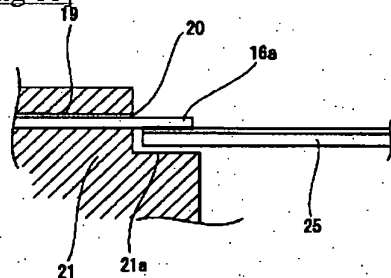
[Drawing 6]



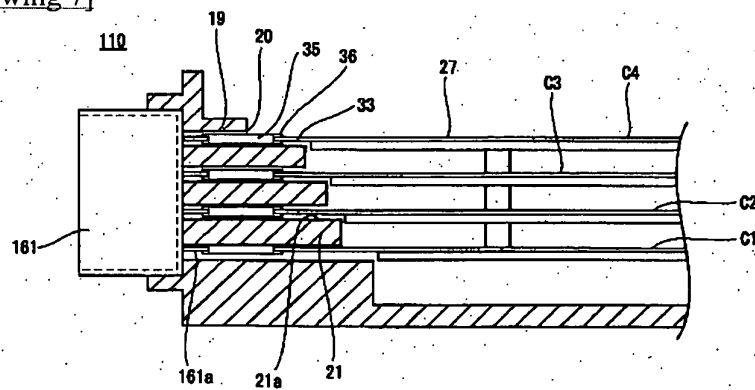
[Drawing 9]



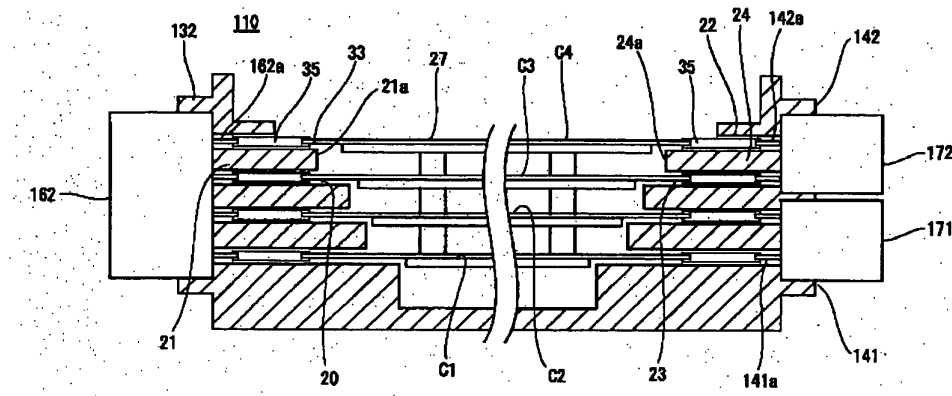
[Drawing 11]



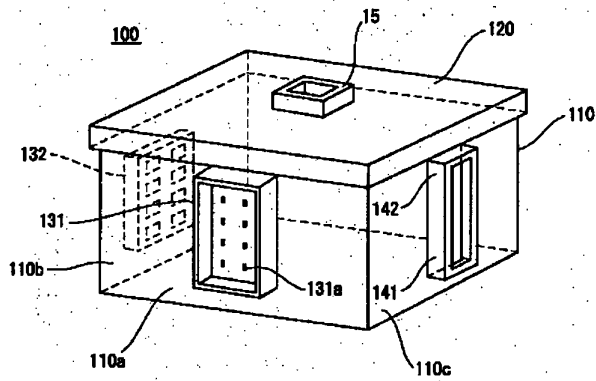
[Drawing 7]



[Drawing 8]

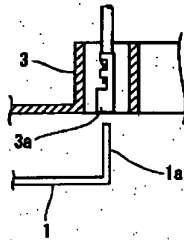


[Drawing 10]

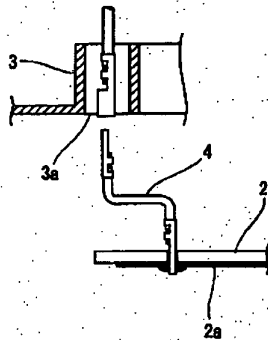


[Drawing 12]

( A )



( B )



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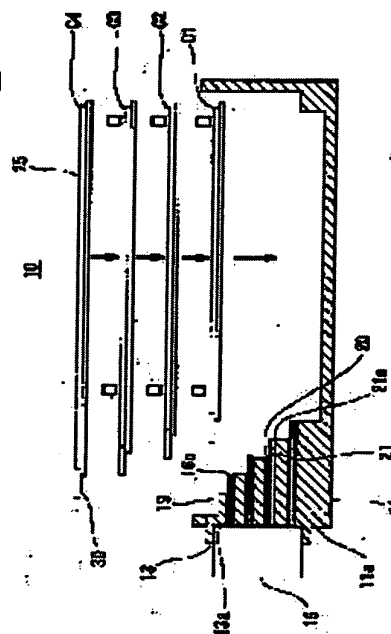
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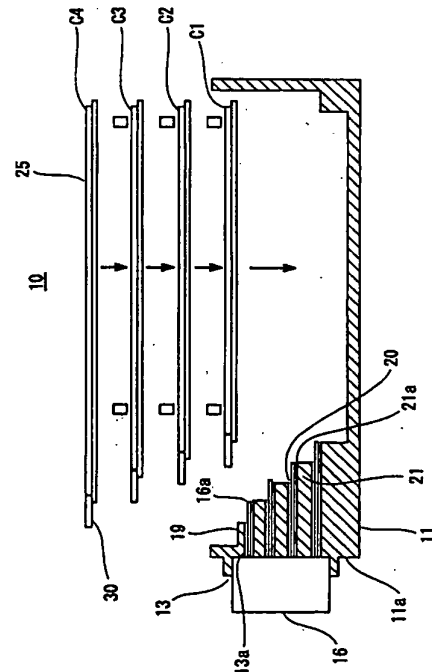
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(54) 【発明の名称】 電気接続箱および該電気接続箱の組立方法

(57) 【要約】

【課題】 電気接続箱の組立および接続の作業性を向上させる。

【解決手段】 電気接続箱10のケース側壁11aにコネクタ16、ヒューズまたは／およびリレーを収容する外部端子収容部13を設け、その内面位置に端子貫通部19aを水平方向に設けると共に、最上段の端子貫通部19dより最下段の端子貫通部19にかけてケース内部側に突出させた階段状の端子受け部21aを設け、この各端子貫通部19aよりケース内へ突出させたコネクタ16等の端子16a、またはこれら外部端子と接続する中継端子を、ケース内に積層配置された各層のプリント基板25やバスバーの端末の端子30と各段の端子受け部上で接続する。



## 【特許請求の範囲】

【請求項1】 電気接続箱のケース側壁にコネクタ、ヒューズまたは／およびリレーを収容する外面開口の外部端子収容部を設け、該外部端子収容部を設けたケース側壁の内面位置に、上記外部端子収容部の底面に上下並列する端子穴と連通する位置に端子貫通部を水平方向に設けると共に、最上段の端子貫通部より最下段の端子貫通部にかけてケース内部側に突出させて階段状の端子受け部を設け、

上記外部端子収容部に取り付けるコネクタ、ヒューズまたは／およびリレーの外部端子、またはこれら外部端子と接続する中継端子を上記各端子貫通部のケース内部側開口より突出させる一方、

上記ケース内部にプリント基板または／および絶縁板上に固定したバスバーを上下積層配置し、これら上記プリント基板または／およびバスバーを固定した絶縁板の上記端子受け部側の長さを、階段状の端子受け部に対応させて長さを相違させ、プリント基板の導体または／およびバスバーに、上記端子受け部の上記端子貫通部から突出する上記外部端子または該外部端子と接続した中継端子とを接続していることを特徴とする電気接続箱。

【請求項2】 上記外部端子または該外部端子と接続した中継端子と、プリント基板の導体または／およびバスバーとは、半田付けまたは溶接で接続している請求項1に記載の電気接続箱。

【請求項3】 上記外部端子または該外部端子と接続した中継端子と、プリント基板の導体または／およびバスバーとは、一方を雄端子とし、他方に雌端子を取り付けて雌雄嵌合接続し、または該他方を圧接スロットを設けた端子として圧接接続させている請求項1に記載の電気接続箱。

【請求項4】 請求項1乃至請求項3にいずれか1項に記載の電気接続箱の組立方法であって、

上記ケース内部に上下積層して収容する上記プリント基板または／およびバスバーを固定した絶縁板は、最下層のものから順番に上方よりケース内部に挿入し、挿入後にプリント基板の導体またはバスバーを上記外部端子または中継端子と接続させ、その後、順次ケース内に挿入した後に上記外部端子または中継端子との接続を繰り返して、コネクタ、ヒューズまたは／およびリレーと、内部回路となる上記プリント基板の導体または／およびバスバーとを接続している電気接続箱の組立方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、自動車に搭載する電気接続箱および該電気接続箱の組立方法に関し、特に、コネクタ、ヒューズまたは／およびリレーと内部回路との接続構造および接続方法を改良するものである。

## 【0002】

【従来の技術】自動車に搭載される電気接続箱は、従来

より、コネクタ、ヒューズまたは／およびリレーの外部端子と内部回路との接続方法として、図12(A)

(B)等に示す方法が採用されている。図12(A)に示す方法では、内部回路を構成するバスバー1の先端を屈折させて雄端子1aとし、コネクタ3の雌形状の端子3aに嵌合接続している。図12(B)に示す方法では、内部回路を構成するプリント基板2とコネクタ側の端子3aとをリード線4を介して接続している。

## 【0003】

【発明が解決しようとする課題】近時、自動車に搭載される電装品の急増に伴い、電気接続箱の内部に収容される回路、即ち、バスバーやプリント基板の積層数が急増していると共に、コネクタ極数の増加、さらには高密度に分岐回路を形成するための部品点数も増加傾向にある。従って、上記のような従来の接続方法では、接続構造が複雑となり、組立作業が困難でますます手間がかかるという問題があった。

【0004】本発明は上記問題に鑑みてなされたもので、コネクタ、ヒューズまたは／およびリレーの外部端子と内部回路との接続構造を改良して、内部回路の筐体への組み付け作業を容易かつ効率よく行うことができる電気接続箱および該電気接続箱の組立方法の提供を課題としている。

## 【0005】

【課題を解決するための手段】上記課題を解決するために、本発明は、電気接続箱のケース側壁にコネクタ、ヒューズまたは／およびリレーを収容する外面開口の外部端子収容部を設け、該外部端子収容部を設けたケース側壁の内面位置に、上記外部端子収容部の底面に上下並列する端子穴と連通する位置に端子貫通部を水平方向に設けると共に、最上段の端子貫通部より最下段の端子貫通部にかけてケース内部側に突出させて階段状の端子受け部を設け、上記外部端子収容部に取り付けるコネクタ、ヒューズまたは／およびリレーの外部端子、またはこれら外部端子と接続する中継端子を上記各端子貫通部のケース内部側開口より突出させる一方、上記ケース内部にプリント基板または／および絶縁板上に固定したバスバーを上下積層配置し、これら上記プリント基板または／およびバスバーを固定した絶縁板の上記端子受け部側の長さを、階段状の端子受け部に対応させて長さを相違させ、プリント基板の導体または／およびバスバーに、上記端子受け部の上記端子貫通部から突出する上記外部端子または該外部端子と接続した中継端子とを接続していることを特徴とする電気接続箱を提供している。

【0006】即ち、外部端子と内部回路の端子は、予め接続する内外端子同士が対向するように位置合わせしておくと共に、接続位置はケース側壁とし、かつ下層から上層に向かって接続位置が外側に移動するよう階段状に接続位置をずらしている。上記構成とすると、内部回路を構成するプリント基板または／およびバスバーが多層

であっても、最下層のものから順にケース内部に容易に収容でき、かつ収容されたときには接続する内外端子が水平方向に対向しているため、一層ずつ内外端子を正確かつ容易に接続しながら積層配置することができ、電気接続箱の組立作業性を向上させることができる。

【0007】なお、上下層で接続位置を階段状にずらす方法として、外部端子の長さを上下層で漸次的に異ならせる他、外部端子の長さは上下層で同一としながら、該外部端子と内部端子とを中継端子を介して接続し、該中継端子の長さを下層から上層にかけて漸次的に長くしていてもよい。

【0008】上記外部端子または該外部端子と接続した中継端子と、プリント基板の導体または／およびバスバーとは、半田付けまたは溶接で接続することが好ましい。

【0009】あるいは、上記外部端子または該外部端子と接続した中継端子と、プリント基板の導体または／およびバスバーとは、一方を雄端子とし、他方に雌端子を取り付けて雌雄嵌合接続してもよい。さらに、他方を圧接スロットを設けた端子として圧接接続させてもよい。この場合、雄端子を挿入する雌端子開口部、または上記圧接スロットが上方を向くように端子を取り付けることにより、ケース内部に積層収容されたプリント基板または／およびバスバーを上から強く押しつけるだけで、階段状に接続位置をずらした全層の内外端子接続を一気に完了させることができ、端子接続・組立作業の効率を大幅に向上させることができる。

【0010】また、本発明は、上述の電気接続箱の組立方法を提供している。即ち、上記ケース内部に上下積層して収容する上記プリント基板または／およびバスバーを固定した絶縁板は、最下層のものから順番に上方よりケース内部に挿入し、挿入後にプリント基板の導体またはバスバーを上記外部端子または中継端子と接続させ、その後、順次ケース内に挿入した後に上記外部端子または中継端子との接続を繰り返して、コネクタ、ヒューズまたは／およびリレーと、内部回路となる上記プリント基板の導体または／およびバスバーとを接続している電気接続箱を組み立てている。

【0011】

【発明の実施の形態】以下、本発明の実施形態を図面を参照して説明する。

【0012】図1乃至図3は本発明の第1実施形態に係る電気接続箱10を示し、該電気接続箱10は、ロアケース11とアッパーケース12で構成されるケース内部に内部回路板C1からC4を収容している。

【0013】上記ロアケース11の一側壁11aには、図3に示すように、コネクタ16を収容する外面開口のコネクタ収容部13を設け、アッパーケース12の上面にヒューズ17を収容する外面開口のヒューズ収容部14とリレー18を収容する外面開口のリレー収容部15

とを設けている。

【0014】上記コネクタ収容部13の底面には、端子穴13aを上下4段に並設し、ロアケース11の側壁11aの内面位置には、これら端子穴13aにそれぞれ連通する位置に上下4段の端子貫通部19を水平方向に設けると共に、最上段の端子貫通部19から最下段の端子貫通部19にかけてケース内部側に突出させた階段状部21を形成している。上記端子貫通部19は、この階段状部21を夫々水平に貫通し、該階段状部21の各階垂直面にケース内部側開口20を形成している。また、この階段状部21の各階水平面は、上記端子貫通部19を貫通してケース内部側開口20より突出したコネクタ側の端子16aを支える端子受け部21aを構成している。これら端子穴13aおよび端子貫通部19の位置は、ロアケース11内に回路板C1～C4を収容した際に接続する内部端子の位置と対向するように、予め位置合わせして設計している。

【0015】上記ロアケース11内に4層に積層配置される内部回路板C1～C4は、いずれもプリント基板25からなる。また、このプリント基板25はそれぞれ長さを異ならせている。詳しくは、下段から上段にかけて、上記端子受け部21aの長さに対応させて、端子受け部21a側にのみ延在させている。上記プリント基板25の端末部は端子ピッチおよび幅に応じた導体パターンを形成するか、或いは、導体の端末には溶接用端子30を半田付け又は溶着し、該溶接用端子30をプリント基板25の周縁より端子受け部21a側に突出させている。

【0016】次に、上記電気接続箱10に上記内部回路体C1～C4を収容し組み立てる作業手順を説明する。まず、図1に示すように、コネクタ収容部13にコネクタ16を挿入し、コネクタ側の端子16aを各段の端子貫通部19に貫通させ、ケース内部側の開口20からケース内に突出させておく。次に、ロアケース11に最下段の回路板C1を上方から挿入し、相対向するプリント基板25の端末部の導体パターン又は端子30とコネクタ側端子16aとを端子受け部21a上で半田付けで接続する。次いで、第2段の回路板C2、第3段の回路板C3、最上段の回路板C4を順次挿入し、各層ごとに、相対向するプリント基板25の端子30とコネクタ側端子16aを端子受け部21a上で半田付けで接続して、図2に示すように、4層の内部回路体C1～C4をコネクタ16に接続する。なお、半田付けに代えて溶接で接続しても良い。

【0017】上記方法により組み立てられた電気接続箱10は、階段状部21を形成したことにより、ロアケース11が底部から上部に向かって大きく開口すると共に、各層の内部回路体C1～C4とコネクタ16との接続位置も内部から外側に向かってずれていくため、最下段の回路体C1から順に、1層ずつ、ケース内への収容



および内外端子接続を繰り返しながら、回路体C1〜C4を容易に積層配置することができる。特に、接続するプリント基板上の端末部パターン又は、内外の端子30と、コネクタ側の端子16aが相対向するように予め端

子の配置を設計しているため、作業中に接続する内外端子を確認する手間が省け、組立作業の効率と正確性を向上させることができる。

【0018】図4及び図5は上記第1実施形態の変形例を示し、内外端子の接続を半田接続ではなく、雌雄端

子の嵌合接続によって行っている点が上記第1実施形態と異なる。

【0019】詳しくは、図4(A)に示すように、プリント基板の導体端末に雄端子31を接続し、一方のコネクタ側の端子16aは先端に一对のバネ片32を有する雌端子として、雌端子32の雄端子31を挿入して嵌合接続させている。このとき、雄端子31を雌端子32に上方から挿入するため、図5に示すように、雄端子32を取り付けたプリント基板25を強く上から押し付けることにより、各層の内外端子接続を一気に完了させることができる。なお、図4(B)に示すように、端子16aは圧接スロットを設けた端子として、雄端子31に圧接接続させてもよい。

【0020】図6乃至図10は、本発明の第2実施形態に係る電気接続箱100を示す。該電気接続箱100は、ロアケース110とアッパーケース120で構成されるケース内部に内部回路板C1からC4を収容している。

【0021】上記ロアケース110の相隣接する側壁110a、110bには、図6に示すように、コネクタ161、162を収容する外面開口のコネクタ収容部131、132をそれぞれ設け、側壁110bと対向する側壁110cには、ヒューズ171、172を収容する外面開口のヒューズ収容部141、142を上下2段に設けている。アッパーケース120の上面には、リレー18を収容する外面開口のリレー収容部15とを設けている。

【0022】上記ヒューズ収容部141には、図8に示すように、ヒューズ端子171を挿入する端子穴141aを上下2段に並設し、ヒューズ収容部142にも、同様にヒューズ端子172を挿入する端子穴142aが上下2段に並設され、側壁110cの内面位置には、これら端子穴141aに連通する位置に端子貫通部22を水平方向に設けると共に、最上段の端子貫通部22と最下段の端子貫通部22にかけて同一ピッチでケース内部側に突出させた階段状部24を形成している。上記端子貫通部22は、この階段状部24を夫々水平に貫通し、該階段状部24の各階垂直面にケース内部側開口23を形成している。また、この階段状部24の各階水平面は、上記端子貫通部22を貫通してケース内部側開口23より突出した端子を支える端子受け部24aを構成してい

る。これら端子穴141aおよび端子貫通部22の位置は、ロアケース110内に回路板C1〜C4を収容した際に相接する内部端子の位置と対向するように、予め位置合わせして設計しておく。

【0023】なお、コネクタ収容部131の形状、および側壁110a、110bの内面位置に形成する端子貫通部、ケース内部側開口、階段状部、端子受け部の構造は、図7および図8に示すように、上記第1実施形態の端子貫通部19、ケース内部側開口20、階段状部21、端子受け部21aと同様であるため、同一符号を付して説明を省略する。また、本実施形態では、側壁110aの階段状部21と側壁110bの階段状部21の高さは同一に設定しているが、必ずしも完全同一でなくともよく、高さの差異は端子形状によって吸収することができる。

【0024】上記ロアケース110内に4層に積層配置される内部回路板C1〜C4は、いずれも絶縁板26にバスバー27を固定した構成としている。また、この絶縁板26は各層で縦横の寸法を相違させている。詳しくは、下段から上段にかけて、三方に位置する上記端子受け部21a、24aの長さに対応させて、該三方へそれぞれ延在させている。上記バスバー27の端末は雄形状に仕上げて雄端子33とし、該雄端子33を絶縁板26の周縁より側壁110a〜110cの3方向にそれぞれ突出させている。

【0025】上記電気接続箱100に内部回路体C1〜C4を収容し組み立てる作業手順を説明する。まず、端子貫通部19、22のそれぞれの長さに対応した、長さの異なる中継端子35を用意する。該中継端子35は、図9に示すように、その両端に圧接スロット36を形成している。この中継端子35の一端の圧接スロット36に、コネクタの端子およびヒューズの端子を圧接接続するが、このとき、最下段のコネクタ端子161aおよびヒューズ端子171には最長の中継端子35を圧接接続し、上段になるに従って順次短い中継端子35を各端子に圧接接続していく。

【0026】次に、図7および図8に示すように、中継端子35を取り付けたコネクタ161、162をコネクタ収容部131、132に、ヒューズ171、172をヒューズ収容部141、142にそれぞれ挿入し、該中継端子35を端子貫通部19、22に貫通させ、ケース内部側開口20、23からケース内に突出させておく。次に、ロアケース110に最下段の回路板C1を上方から挿入し、3方向でそれぞれ相対向するバスバー27の端子33と中継端子35とを端子受け部21a上で圧接接続して、バスバー27とコネクタ161、162およびヒューズ171とを接続する。次いで、中継端子35を介在させながら、第2段の回路板C2、第3段の回路板C3、最上段の回路板C4を順次挿入し、各層ごとに、3方向でそれぞれ相対向するバスバーの端子33と

中継端子35を端子受け部21a、24a上で圧接続して、図10に示すように、4層の内部回路体C1～C4をコネクタ161、162およびヒューズ171、172に接続する。

【0027】上記構成の電気接続箱110のように、電気接続箱の複数の側面にコネクタ収容部131、132やヒューズ141、142が設けられていても、各側壁110a～110cの内面位置に階段状部21、24を形成することにより、最下段の回路体から挿入および接続作業を順次行いながら、容易かつ効率よく積層配置することができる。また、中継端子35は汎用品でありサイズも多様に揃うため、設計変更などにも容易かつ低コストに対応できる。

【0028】なお、本発明は上記実施形態に限定されるものではなく、図11に示すように、コネクタ側の端子16の先端下面にプリント基板25の先端が挿入され、該プリント基板25の上面の導体と端子16aとをハンダ付けしてもよい。また、コネクタ、ヒューズ、リレーの全てを側壁に取り付ける構成としてもよい。

【0029】

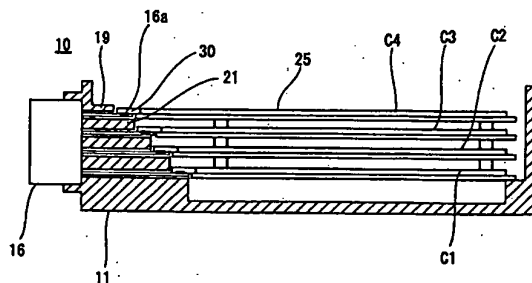
【発明の効果】以上の説明より明かなように、本発明によれば、最下段に配置される回路体から順に1層ごとに、ケース内に挿入し、かつ、設計段階からの位置合わせにより相対向する内外端子を接続しながら、順次上段の回路体を積み重ねて組立および接続を完了させることができるため、従来困難で複雑であった電気接続箱の組立作業を作業性と正確性を向上させることができる。

【0030】また、内外端子の接続位置にあたるケース側壁内面位置に階段状部を設け、上段から下段にかけて接続位置を内方にずらしているため、内外端子を雌雄嵌合接続する場合は、積層配置した内部回路体を上から強く押し付けることによって、全層の内外端子を一気に嵌合させて接続完了することができる。

【図面の簡単な説明】

【図1】 本発明の第1実施形態に係る電気接続箱の要部分解断面図である。

【図2】



【図2】 図1に示す電気接続箱に回路体を収容した状態を示す断面図である。

【図3】 図1に示す電気接続箱の外観斜視図である。

【図4】 (A) (B)は端子同士の接続部の変形例を示す図面である。

【図5】 図4 (A)に示す端子接続構造によって、全層の内部回路と外部端子との接続作業を示す要部断面図である。

【図6】 本発明の第2実施形態にかかる電気接続箱のロアケースを示す平面図である。

【図7】 図6に示すロアケースに内部回路を積層配置した状態を示すVII-VII線断面図である。

【図8】 図6に示すロアケースに内部回路を積層配置した状態を示すVIII-VIII線断面図である。

【図9】 図7、図8に示す内外端子接続構造を示す要部拡大図である。

【図10】 第2実施形態に係る電気接続箱の全体斜視図である。

【図11】 他の変形例を示す断面図である。

【図12】 (A) (B) (C)は従来例の図である。

【符号の説明】

C1～C4 内部回路体

10、100 電気接続箱

11、110 ロアケース

13 コネクタ収容部

14 ヒューズ収容部

16 コネクタ

16a コネクタの端子

17 ヒューズ

171 ヒューズの端子

19 端子貫通部

21、24 階段状部

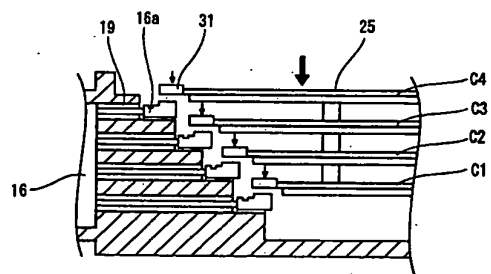
21a、24a 端子受け部

25 プリント基板

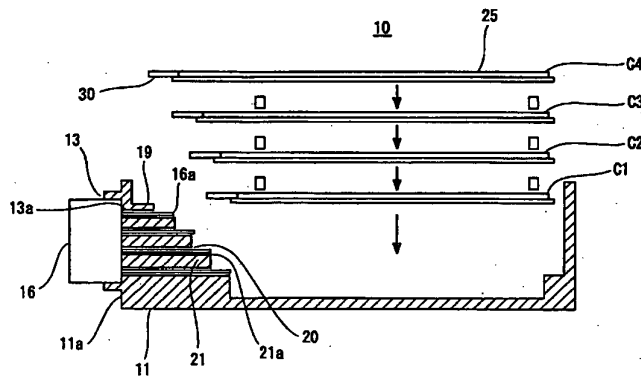
27 パスバー

35 中継端子

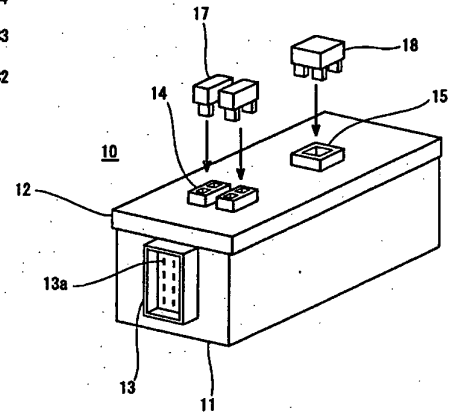
【図5】



【図1】

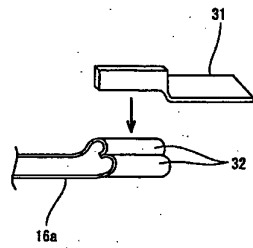


【図3】

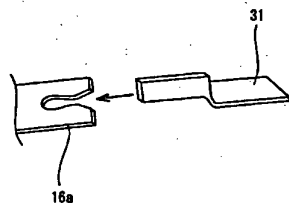


【図4】

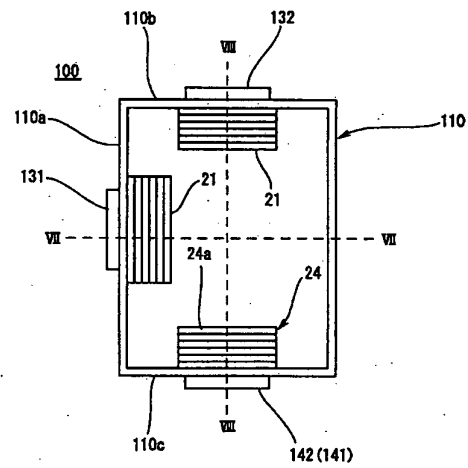
(A)



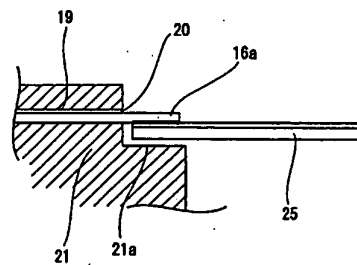
(B)



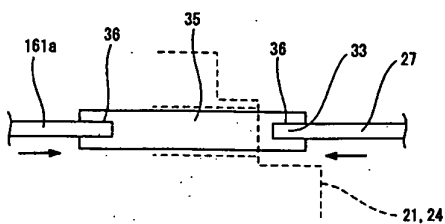
【図6】



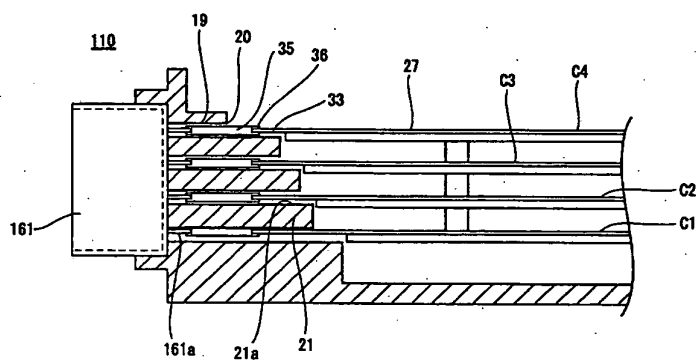
【図11】



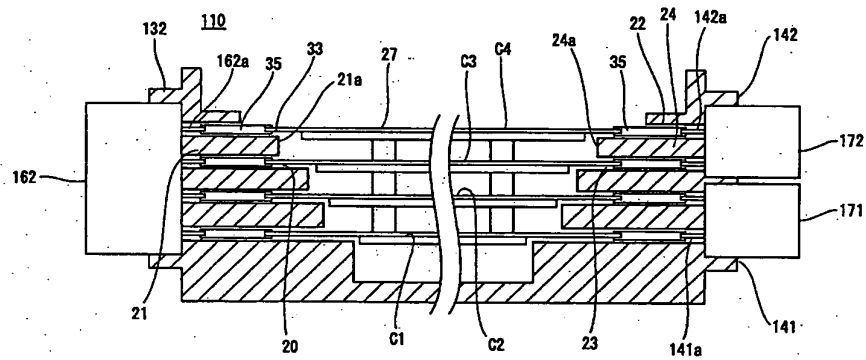
【図9】



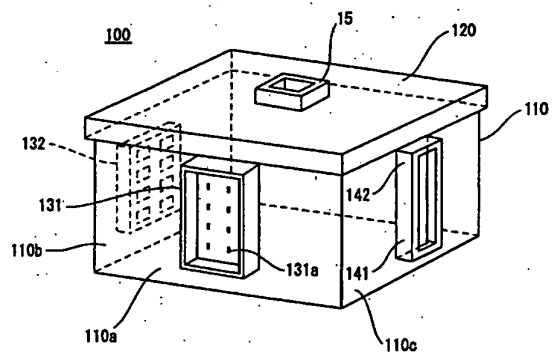
【図7】



【図8】

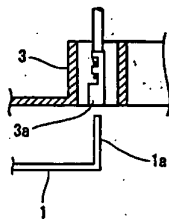


【図10】



【図1,2】

(A)



(B)

